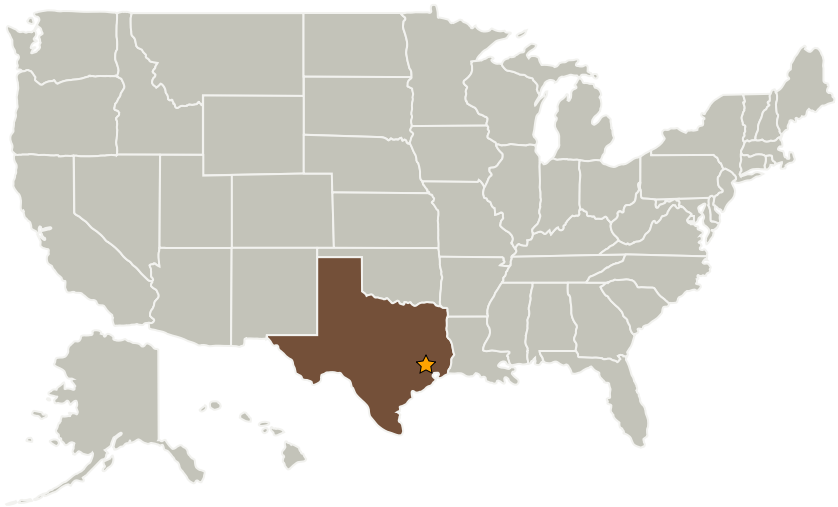
Handheld FRET-Aptamer Sensor for Bone Markers, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

Astronauts lose approximately 1-1.5% of their bone mass per month during space travel due to a lack of physical stress in the microgravity environment. Although, no effective treatments or prophylactic regimens have yet been defined, it is important to monitor the bone loss process in space. As such, the sensor must be compact and facile to operate. Therefore, OpTech proposes to extend its already successful and patent-pending competitive fluorescence resonance energy transfer (FRET)-aptamer assay technology to the detection of bone loss and formation markers such as osteocalcin fragments, hydroxylysine, hydroxyproline, C-terminal and N-terminal telopeptides. In Phase I, OpTech will develop, clone and sequence aptamers to each of these markers. OpTech will also incorporate fluorophore-labeled dUTP into the sequenced aptamers by asymmetric PCR and complex them to their quencher-labeled bone markers for testing in buffer, animal sera, and urine. Finally, in Phase I OpTech will dry and reconstitute the assays that will be tested using a commercially available handheld, battery-operated fluorometer and validated using OpTech's spectrofluorometer. In Phase II, the FRET-aptamer assays will be optimized and packaged in special leak-proof sealed plastic cuvettes and delivered to NASA along with the handheld fluorometer for testing on the ISS or other space missions.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Operational Technologies Corporation	Supporting Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB), Veteran-Owned Small Business (VOSB)	San Antonio, Texas

Primary U.S. Work Locations
Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John D Bruno

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.3 Mechanical Systems
    - TX12.3.4 Reliability, Life Assessment, and Health Monitoring